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Forest Pest Conditions

IN THE PACIFIC NORTHWEST

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This is the 24th annual report of forest pest conditions in Oregon and Washington based on cooperative surveys sponsored by the Northwest Forest Pest Action Council. The combined efforts of many organizations and individuals made these surveys possible. Special acknowledgment is made to the principal cooperators, Oregon State Department of Forestry and Washington State Department of Natural Resources and the surveillance efforts of private, State, and Federal foresters.

COVER PHOTO: **Aerial photo (1:31680 scale) showing circular and semi-circular *Poria weirii* root rot centers in the vicinity of Waldo Lake (located at top of photo), Willamette National Forest.**

FOREST PEST CONDITIONS IN THE PACIFIC NORTHWEST

1971

BY

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INSECT AND DISEASE CONTROL BRANCH
DIVISION OF TIMBER MANAGEMENT
PACIFIC NORTHWEST REGION
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

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INTRODUCTION

Forest pest infestations were detected and recorded by aerial and ground surveys made in cooperation with the Oregon State Department of Forestry and the Washington Department of Natural Resources. Ground surveys were made to verify aerial survey findings, detect low-level populations, and to evaluate stand conditions and insect and disease population trends.

The volume of timber killed by bark beetles, except for Oregon pine ips, was estimated from counts of dead trees made during aerial survey. Volumes lost to defoliators, sucking insects, and Oregon pine ips were not estimated.

Timber losses due to bears, dying hemlock, and the important diseases are reported. The extent of insect outbreaks is summarized in Table 1. Infestations are recorded by volume losses by land ownership and classification in Tables 2 and 3.

CONDITIONS IN BRIEF

Outbreaks of bark beetles were little changed from last year. The mountain pine beetle continued to cause heavy mortality in lodgepole pine stands of eastern Oregon. The Douglas-fir beetle was the most destructive bark beetle on west side forests. Defoliators caused the most widespread damage in both States. Sharp increases were evident in western spruce budworm, black-headed budworm, and Douglas-fir tussock moth populations.

Dwarf mistletoes and root rots continue to be the major causes of disease losses in the Pacific Northwest. *Poria weirii* is becoming increasingly important as an obstacle to productive growth of young Douglas-fir. No major outbreaks of conifer foliage diseases were observed this year. Due for the most part to the exceptionally mild winter, the incidence of abiotic diseases was lower than usual this year.

Findings of both aerial and ground surveys are as follows:

1. *Douglas-fir beetle.*—Tree killing increased on the west side of the Cascade Mountains and decreased on the east side. Tree mortality amounted to over 11 million board feet.
2. *Spruce beetle.*—Outbreaks decreased in Oregon and Washington. Three million board feet of timber was killed, most of which occurred in wilderness areas.
3. *Fir engraver.*—Outbreaks decreased sharply in both Oregon and Washington. Nearly 46 million board feet of timber was killed.
4. *Mountain pine beetle.*—Outbreaks occupied about the same acreage as last year in lodgepole pine. A slightly downward trend was noted in western white and ponderosa pine stands. Tree mortality amounted to over 76 million board feet of lodgepole pine, 39 million board feet of western white pine, 3 million board feet of ponderosa pine, and 27,000 board feet of sugar pine.
5. *Western pine beetle.*—Infestations remained at low levels in both States. Nearly 3 million board feet of timber was killed.
6. *Silver fir beetles.*—Tree killing declined this year. About 320,000 board feet of timber was killed.
7. *Oregon pine ips.*—Damage increased in Oregon but remained static in Washington. Thirty-nine thousand acres were affected.
8. *Western spruce budworm.*—Defoliation increased sharply in both Oregon and Washington. Fourteen thousand acres were defoliated in north-central Washington and 46,000 acres were defoliated in northeast Oregon.

9. *Black-headed budworm.*—Outbreaks increased in Washington where over 200,000 acres of western hemlock and associated species sustained light to moderate defoliation.
10. *Douglas-fir tussock moth.*—Populations are increasing. Over 2,000 acres of Douglas-fir were severely defoliated in Washington. Some mortality occurred on 1,500 acres.
11. *Larch casebearer.*—The infestation spread rapidly, particularly in northeast Oregon.
12. *Balsam woolly aphid.*—Tree mortality caused by the aphid decreased. Outbreaks occurred on 114,000 acres, primarily in the Cascade Range.
13. *Larch budmoth.*—Populations collapsed. Only 880 acres of larch were lightly defoliated in Washington.
14. *Sawflies on knobcone pine.*—A minor amount of defoliation occurred on 1,100 acres in southwest Oregon.
15. *Pandora moth.*—No defoliation occurred in 1971, but feeding by the first-year larvae is expected in 1972 on the Deschutes National Forest in Oregon.
16. *Black stain root disease.*—Mortality of Douglas-fir was detected on nine National Forests throughout the Region. Damage is increasing.

Table 1.–Summary of forest insect infestations in Oregon and Washington during 1970 and 1971
(In acres)

Insects[1]	Oregon		Washington		Regional total	
	1970	1971	1970	1971	1970	1971
Bark beetles:						
Douglas-fir beetle (westside)	6,030	16,460	3,670	2,760	9,700	19,220
Douglas-fir beetle (eastside)	2,870	12,280	23,570	12,200	26,440	24,480
Spruce beetle	3,390	800	8,840	4,670	12,230	5,470
Fir engraver	301,920	154,770	97,870	26,410	399,790	181,180
Mountain pine beetle (L)	251,320	248,470	1,960	1,530	253,280	250,000
Mountain pine beetle (S)	180	480	0	0	180	480
Mountain pine beetle (W)	98,100	66,050	18,610	24,140	116,710	90,190
Mountain pine beetle (P)	53,620	48,030	4,680	6,700	58,300	54,730
Oregon pine ips	17,500	38,930	1,900	730	19,400	39,660
Western pine beetle	73,980	59,290	1,050	9,750	75,030	69,040
Silver fir beetles	0	20	10,040	1,100	10,040	1,120
All bark beetles	808,910	645,580	172,190	89,990	981,100	735,570
Defoliators:						
Larch sawfly	1,910	0	0	0	1,910	0
Sawflies on true fir	1,680	0	0	0	1,680	0
Sawflies on knobcone pine	0	1,100	0	0	0	1,100
Larch budmoth	0	0	10,580	880	10,580	880
Western spruce budworm	13,780	28,200	240	18,260	14,020	46,460
Black-headed budworm	0	0	63,840	209,880	63,840	209,880
Pandora moth	5,120	0	0	0	5,120	0
Douglas-fir tussock moth	0	0	0	2,430	0	2,430
Needle miner on lodgepole pine	600	0	0	0	600	0
All defoliators	23,090	29,300	74,660	231,450	97,750	260,750
Sucking insects:						
Balsam woolly aphid	179,540	96,620	24,170	18,010	203,710	114,630
Spruce aphid	0	0	4,690	200	4,690	200
All sucking insects	179,540	96,620	28,860	18,210	208,400	114,830
All insects	1,011,540	771,500	275,710	339,650	1,287,250	1,111,150

[1] Mountain pine beetle infestations are separated by tree species: L, lodgepole pine; S, sugar pine; W, western white pine; P, ponderosa pine.

17. *Bynum's blight.*—This needle disease has been reported in 38 plantations in southwestern Oregon. It does not appear to be spreading.
18. *Dwarf mistletoes.*—Control was accomplished on about 10,000 acres in Oregon and Washington.
19. *Laminated root rot.*—Mortality is becoming increasingly more widespread in west side Douglas-fir plantations.
20. *Annosus root rot.*—Thinning in many western hemlock stands is resulting in serious damage.
21. *Poplar leaf spot.*—An outbreak occurred in the Steens Mountain Range in southeastern Oregon.
22. *Rhizina root rot.*—Serious damage is occurring to some Douglas-fir planted on burned sites.
23. *White pine blister rust.*—Progress toward developing rust-resistant trees has been excellent.

MAJOR BARK BEETLES

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae* Hop.

Douglas-fir beetle activity on the west side of the Cascade Mountains increased in Oregon and decreased in Washington. The estimated loss for both States is 7.3 million board feet. The heaviest losses, about 5.3 million board feet, occurred in the Clackamas, Collawash, and Hood River drainages on the Mt. Hood National Forest in Oregon. However, recent ground surveys indicate that the outbreak has collapsed. In western Washington this beetle remains active in the Wind and Little White Salmon River drainages on the Gifford Pinchot National Forest. Ground surveys in these areas indicate that a large number of beetles are being produced in storm-damaged trees and debris and additional losses may occur next year.

On the east side of the Cascade Mountains there was an increase in Douglas-fir beetle activity in Oregon, particularly on the Wallowa-Whitman and Umatilla National Forests, where tree killing on these two Forests accounted for 88 percent (1.5 of 1.7 million board feet) of the insect-caused mortality. Losses in eastern Washington had decreased from 3.8 million board feet in 1970 to about 2.2 million board feet in 1971. Most of the losses occurred on the Okanogan, Umatilla and Colville National Forests and the Colville Indian Reservation.

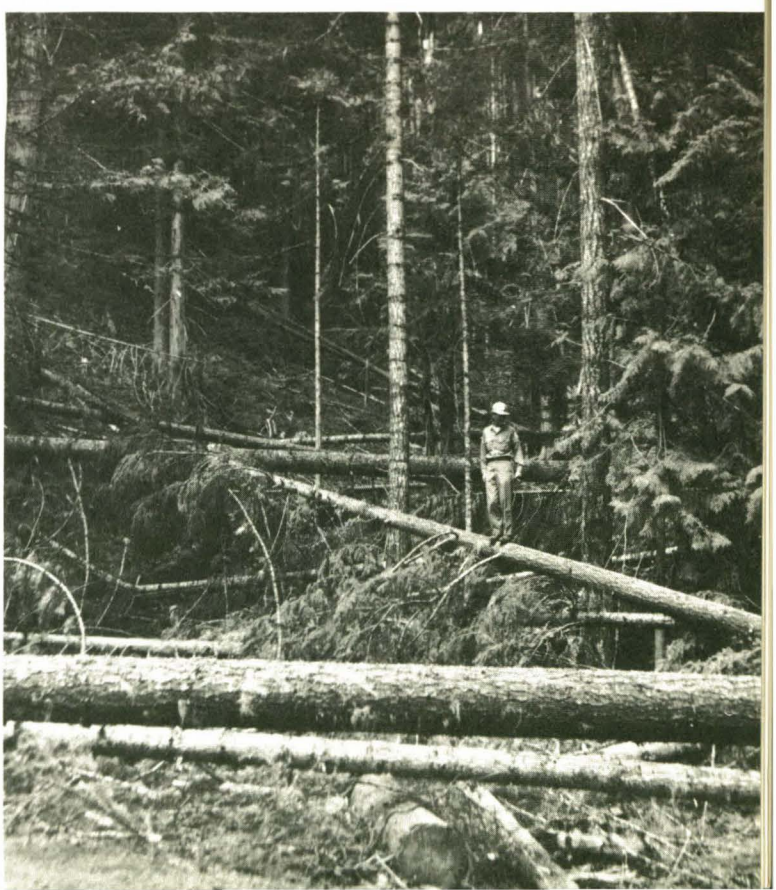

Figure 1.—Windthrow and ice-damaged Douglas-fir timber attracts the Douglas-fir beetle. This material should be logged before the broods emerge to attack standing trees.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae* Hopk.

The mountain pine beetle was the most destructive tree killer in the Pacific Northwest. Most of the mortality occurred in lodgepole pine stands in Oregon where an estimated 6 million board feet of timber was killed on 248,470 acres. The most severe and extensive outbreaks were on the Wallowa-Whitman, Fremont, Deschutes, Winema and Umatilla National Forests. These outbreaks are in overmature stands and are likely to continue for several years until the older, larger diameter trees are eliminated. For the third consecutive year, tree killing in Washington occurred on less than 2,000 acres. The only significant infestation was located on the Colville National Forest. Commercial sales are underway or planned to log the merchantable infested timber and noninfested trees in and near the infestation centers to reduce the rate of spread of the beetles and to maintain timber values of adjacent uninfested stands (Figure 2).

This beetle also infested many overmature western white pine stands in the Cascade Mountains. Although there was a decrease in beetle activity, most of the losses of western white pine occurred in Oregon on the Willamette, Mt. Hood and Umpqua National Forests. In Washington, a slight increase in tree mortality occurred on the Snoqualmie and Wenatchee National Forests and the Yakima Indian Reservation. Commercial timber sales are planned to log as much infested western white pine as possible to reduce the beetle population.

Mountain pine beetle activity in dense, pole-size ponderosa pine stands remained static. In Washington, losses increased slightly on the Snoqualmie National Forest and the Yakima Indian Reservation. Although there was a slight decrease on most National Forest lands in Oregon, most of the mountain pine beetle activity in ponderosa pine occurred on the Wallowa-Whitman National Forest. Some significant tree killing was also recorded on the Deschutes, Fremont and Malheur National Forests. Many young, dense ponderosa pine stands are currently being thinned to reduce stocking and beetle-proof the stands.

There was a slight increase in mountain pine beetle infestations in some sugar pine stands in south-central Oregon. Most of the losses reported occurred as single trees or small groups of trees on the Deschutes, Rogue River and Winema National Forests.

WESTERN PINE BEETLE, *Dendroctonus brevicomis* LeC.

Regionwide, the amount of ponderosa pine killed by this beetle decreased from an estimated 5.3 million board feet in 1970 to 2.7 million board feet in 1971. Most of the infestations were centered on the Malheur National Forest in Oregon. In Washington the heaviest epidemic losses were in Asotin and Columbia Counties on the Umatilla National Forest.

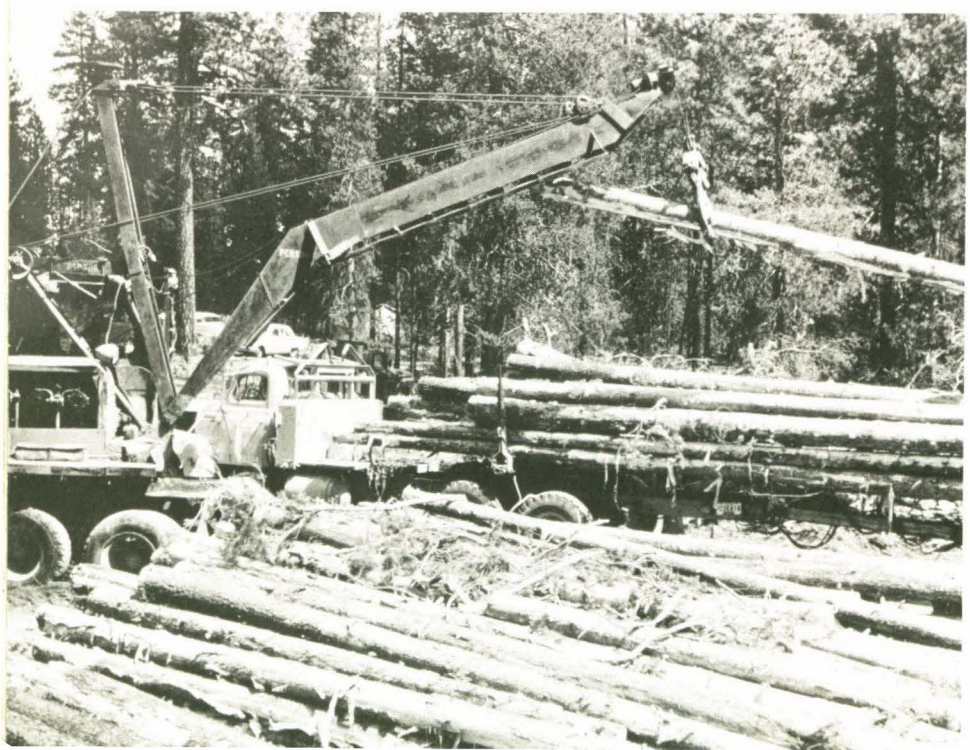

Figure 2.—Loading mountain pine beetle-infested lodgepole pine.

FIR ENGRAVER, *Scolytus ventralis* LeC.

Losses from this beetle in the true fir stands decreased in Oregon and Washington. The estimated loss in 1971 was over 46 million board feet compared to 138 million board feet reported in 1970.

The majority of the tree killing occurred on the Umatilla National Forest in Oregon and Washington. Significant losses were also found on the Wallowa-Whitman and Winema National Forests and on private lands south of Kinzua, Oregon. In Washington, excessive tree killing was reported on the Okanogan National Forest.

SPRUCE BEETLE, *Dendroctonus rufipennis* (Kirby)

Outbreaks in Engelmann spruce stands subsided in most areas of Oregon and Washington. In Oregon, all of the losses occurred on the Wallowa-Whitman National Forest. In Washington, the heaviest damage was reported on the Okanogan National Forest.

An estimated 1.3 million board feet of timber was killed. About half this loss, however, occurred on inaccessible and dedicated lands.

Table 2.—Summary of 1971 infestations in Oregon and Washington for all bark beetle damage excluding Oregon pine ips

Insect[1]	National Forest lands[2]		Forest lands other than National Forest[3]		Dedicated forest lands (Wild. areas & National Parks)[4]		All forest lands	
	Area Acres	*Volume Board feet*	*Area Acres*	*Volume Board feet*	*Area Acres*	*Volume Board feet*	*Area Acres*	*Volume Board feet*
Oregon:								
Douglas-fir beetle (westside)	10,480	3,818,080	5,980	2,938,620	0	0	16,460	6,756,700
Douglas-fir beetle (eastside)	11,310	1,551,420	930	108,000	40	2,700	12,280	1,662,120
Spruce beetle	0	0	0	0	800	145,000	800	145,000
Fir engraver	100,760	25,113,360	53,200	12,052,290	810	5,060,490	154,770	42,226,140
Mountain pine beetle (L)	221,020	72,259,620	16,450	1,497,120	11,000	2,366,700	248,470	76,123,440
Mountain pine beetle (S)	350	21,300	130	5,850	0	0	480	27,150
Mountain pine beetle (W)	38,330	16,315,030	4,030	452,400	23,690	14,969,600	66,050	31,737,030
Mountain pine beetle (P)	19,240	1,614,660	28,690	1,617,710	100	640	48,030	3,233,010
Western pine beetle	49,760	1,757,410	9,520	436,280	10	40,000	59,290	2,233,690
Silver fir beetle	20	15,400	0	0	0	0	20	15,400
Oregon total	451,270	122,466,280	118,930	19,108,270	36,450	22,585,130	606,650	164,159,680
Washington:								
Douglas-fir beetle (westside)	1,830	392,330	770	158,320	160	18,000	2,760	568,650
Douglas-fir beetle (eastside)	7,360	1,301,850	4,690	806,550	150	45,450	12,200	2,153,850
Spruce beetle	1,350	632,500	500	27,500	2,820	523,750	4,670	1,183,750
Fir engraver	19,010	3,296,150	3,680	233,000	3,720	200,250	26,410	3,729,400
Mountain pine beetle (L)	1,310	82,600	180	16,800	40	1,400	1,530	100,800
Mountain pine beetle (W)	15,300	6,004,650	7,000	1,249,700	1,840	265,050	24,140	7,519,400
Mountain pine beetle (P)	1,120	33,600	5,580	131,770	0	0	6,700	165,370
Western pine beetle	6,140	245,870	3,610	182,830	0	0	9,750	428,700
Silver fir beetle	1,100	305,750	0	0	0	0	1,100	305,750
Washington total	54,520	12,295,300	26,010	2,806,470	8,730	1,053,900	89,260	16,155,670
Regional total	505,790	134,761,580	144,940	21,914,740	45,180	23,639,030	695,910	180,315,350

[1] Mountain pine beetle infestations are separated by tree species: L, lodgepole pine; S, sugar pine; W, western white pine; P, ponderosa pine.

[2] Excluding Wilderness areas. The volume that will be salvaged depends upon land use classification, accessibility, and other conditions.

[3] Includes all forested lands not within the boundaries of National Forests or National Parks.

[4] Includes only Wilderness areas of the National Forest system and National Parks.

OREGON PINE IPS, *Ips pini* (Say)

Outbreaks in dense, young ponderosa pine stands increased. Most of this increase occurred in eastern Oregon on the Umatilla, Malheur and Wallowa-Whitman National Forests. Tree killing in Washington decreased. Damage was widely scattered and the outbreaks covered less than a thousand acres.

SILVER FIR BEETLES, *Pseudohylesinus* spp.

The extent and intensity of losses caused by these insects decreased sharply in Washington. Only minor damage was reported on the Mt. Baker and Olympic National Forests. These beetles, after being absent for several years, were found on the Mt. Hood National Forest in Oregon.

MAJOR DEFOLIATOR PROBLEMS

LARCH CASEBEARER, *Coleophora laricella* (Hübner)

Infestations of the larch casebearer have spread rapidly through the Blue Mountains of northeast Oregon. The insect was found as far west and south as Ukiah.

Infestations continue to spread throughout northeastern Washington, but no tree mortality has occurred. No detailed aerial survey was made in northeastern Washington because infestations can now be found in most natural larch stands.

Native and introduced parasites are present, but ineffective, in most infestation centers in Washington.

Table 3.—Summary of 1971 infestations for all defoliators, sucking insects, and Oregon pine ips in Oregon and Washington

Insect	National Forest lands[1]	Forest lands other than National Forest[2]	Dedicated forest lands (Wild. areas & National Parks)[3]	All forest lands
	Area Acres	*Area Acres*	*Area Acres*	*Area Acres*
Oregon:				
Sawflies on knobcone pine	520	0	580	1,100
Spruce budworm	28,200	0	0	28,200
Balsam woolly aphid	78,980	4,980	12,660	96,620
Oregon pine ips	26,110	12,820	0	38,930
Oregon total	133,810	17,800	13,240	164,850
Washington:				
Western spruce budworm	18,260	0	0	18,260
Larch budmoth	880	0	0	880
Douglas-fir tussock moth	400	2,030	0	2,430
Black-headed budworm	154,720	3,220	51,940	209,880
Balsam woolly aphid	10,000	4,870	3,140	18,010
Spruce aphid	0	200	0	200
Oregon pine ips	300	430	0	730
Washington total	184,560	10,750	55,080	250,390
Regional total	318,370	28,550	68,320	415,240

[1] Excluding Wilderness areas.
[2] Includes all forested lands not within the boundaries of National Forests or National Parks.
[3] Includes only Wilderness areas of the National Forest system and National Parks.

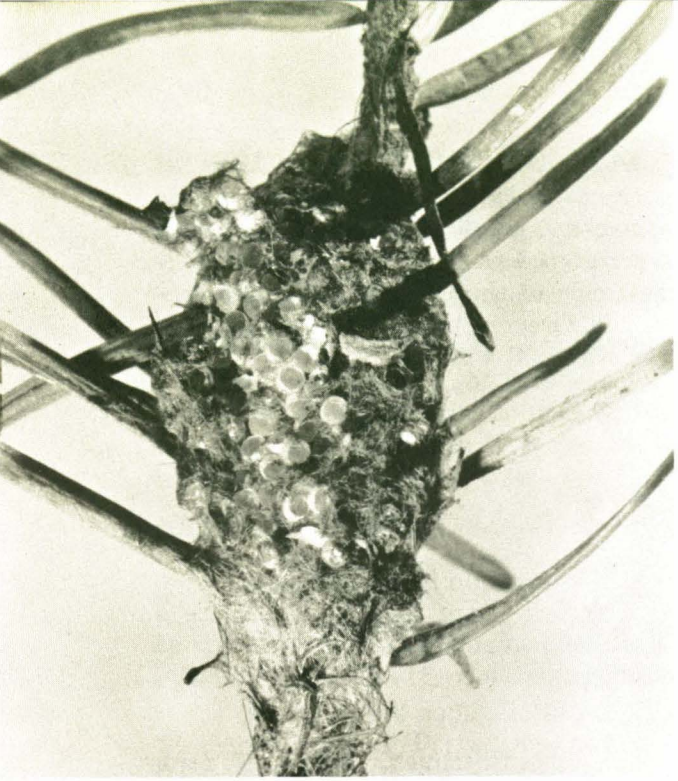

Figure 3.—Hatched egg mass of the Douglas-fir tussock moth.

Figure 4.—Beating defoliating insects off trees during ground detection survey.

DOUGLAS-FIR TUSSOCK MOTH, *Hemerocampa pseudotsugata* McD.

Severe defoliation of pole-size Douglas-fir occurred at several widely scattered locations on the Wenatchee and Okanogan National Forests in Washington.

On the Wenatchee National Forest severe defoliation caused extensive top-killing and tree mortality on 1,500 acres. Fall surveys for overwintering egg masses revealed that most larvae in this area had died in the late instars. The cause of mortality has not been determined. Outbreaks on the Okanogan National Forest were smaller in size and less severe. However, unlike the Wenatchee areas, egg surveys indicate that populations will again be high in these spots next year.

Subepidemic tussock moth populations developed early in the season in true fir stands on the Umatilla, Wallowa-Whitman, and Winema National Forests. Evaluations made during this fall indicate that these populations collapsed.

WESTERN SPRUCE BUDWORM, *Choristoneura occidentalis* Free.

Populations of this important defoliator increased significantly. In Oregon over 28,000 acres on the Wallowa-Whitman National Forest suffered light to heavy defoliation, more than double the defoliated acreage of last year. In Washington the defoliated acreage increased from 240 acres in 1970 to over 18,000 acres in 1971 on the Wenatchee and Okanogan National Forests. Ground surveys revealed high sub-epidemic populations of the budworm along the eastern slopes of the Cascade Mountains in Washington.

BLACK-HEADED BUDWORM, *Acleris gloverana* (Wals.)

Defoliation of western hemlock and associated species increased sharply in western Washington. On the Olympic Peninsula the defoliated areas occupied over 120,000 acres. Light to heavy defoliation also occurred on the Gifford Pinchot, Snoqualmie, and Mt. Baker National Forests. All areas showed significant increases, with the Gifford Pinchot National Forest infestation of 60,000 acres the most spectacular, since no damage was visible on this Forest in 1970.

No defoliation was found in Oregon, but the insects were more abundant than usual.

BALSAM WOOLLY APHID, *Adelges piceae* (Ratz.)

The extent and intensity of damage caused by this insect was lower this year although tree mortality was significant in the true fir stands throughout the Cascade Mountains of Oregon and Washington. Most of the losses in Washington were centered on the Snoqualmie and Gifford Pinchot National Forests. The outbreak on the east side of the Olympic Peninsula continued to kill trees but the rate of spread has been slow. In Oregon, heaviest losses occurred on the Mt. Hood, Willamette, Umpqua, and Rogue River National Forests.

OTHER INSECTS

The following list of insects caused varying degrees of damage to forest and shade trees. These insects are of general interest and are listed as a record, since they could become a threat to forest resources. Some of this information has been compiled from reports supplied by the States' agricultural entomologists and extension officers.

LARCH BUDMOTH, *Zieraphera improbana* (Walker)

Populations on the Snoqualmie National Forest in Washington declined. Very light defoliation occurred on only 880 acres this year.

SPRUCE APHID, *Elatobium abietinum* (Wlkr.)

Minor defoliation occurred on 200 acres of Sitka spruce along the Washington Coast. Reports of this aphid causing injury to ornamental spruces were common in western Oregon and Washington communities. Outbreaks of this aphid generally subside without causing lasting damage.

EUROPEAN PINE SHOOT MOTH, *Rhyacionia buoliana* (Schiff.)

One infested mugho pine was found in Pendleton, Oregon. All pines within one-half mile of this tree were sprayed with Sevin to prevent further spread of the insect. Elsewhere, light populations were detected in the Port of Umatilla and heavy populations were detected at McNary Dam where controls may have to be applied in 1972 to prevent serious tree deformation. An estimated 9 percent of the trees in Hermiston, Oregon, which were treated with Sevin and Diazinon in 1969, sustained light attacks this year. This figure compares with the 7 percent infested in 1970, one year after treatment.

Several years ago a containment zone was established in northwest Washington to prevent movement of infested pines that had not been fumigated. The moth has now become established in ornamental pines outside the containment zone.

Infestations of the shoot moth are known to exist in the following communities:

Western Washington

Vancouver
Chehalis
Centralia

Eastern Washington

Prosser
Kennewick
Pasco
Walla Walla
College Place

Western Oregon

None

Eastern Oregon

McNary Dam
Hermiston
Port of Umatilla

SAWFLY ON KNOBCONE PINE, *Neodiprion* sp.

An unidentified species of sawfly continued to defoliate knobcone pine on the Siskiyou National Forest. The damage has been light and has decreased from 2,000 acres in 1970 to 1,100 acres in 1971. Most of the infestation is located in nonaccessible areas and on poor sites; hence, no control or salvage is planned.

WHITE-FIR SAWFLY, *Neodiprion abietis* Ross

This pest caused light defoliation of true firs on the Winema National Forest on the same areas where subepidemic Douglas-fir tussock moth populations developed early in the season. Some planned Christmas tree sales on the Winema National Forest were cancelled because the trees were unsalable.

NEEDLE MINER, *Coleotechnites* near *milleri* (Busck.)

For the first time since 1964, no damage associated with this pest was reported. Long-term studies were established by Insect and Disease Control personnel to determine impact. Preliminary observations show little mortality after 8 years defoliation.

PANDORA MOTH, *Coloradia pandora* Blake

The only active population in the Pacific Northwest is located east of Newberry Crater, Deschutes National Forest, where over 5,000 acres of ponderosa and lodgepole pine were defoliated last year. After overwintering as pupa, moth flight began July 13, 1971. First and second instar larvae have been observed this fall. This area will be examined carefully in 1972 for damage (Figures 5 and 6).

Figure 5.—A newly emerged adult of the pandora moth.

Figure 6.—Second instar larva of the pandora moth feeding on lodgepole pine.

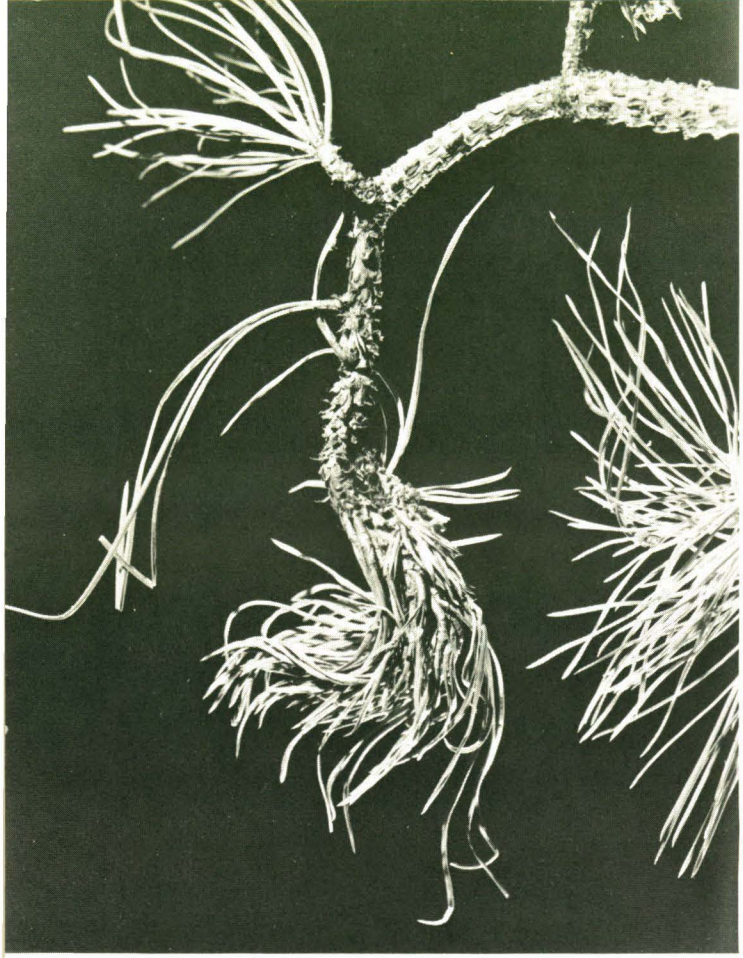

Figure 7.—Pine bud mite damage on ponderosa pine.

Figure 8.—The damage in the right fork of this ponderosa pine shoot was caused by the western pine shoot borer. Often found associated with the borer attack is the less obvious damage in the left fork, the result of "hollow pith" or "ruptured pith," cause unknown.

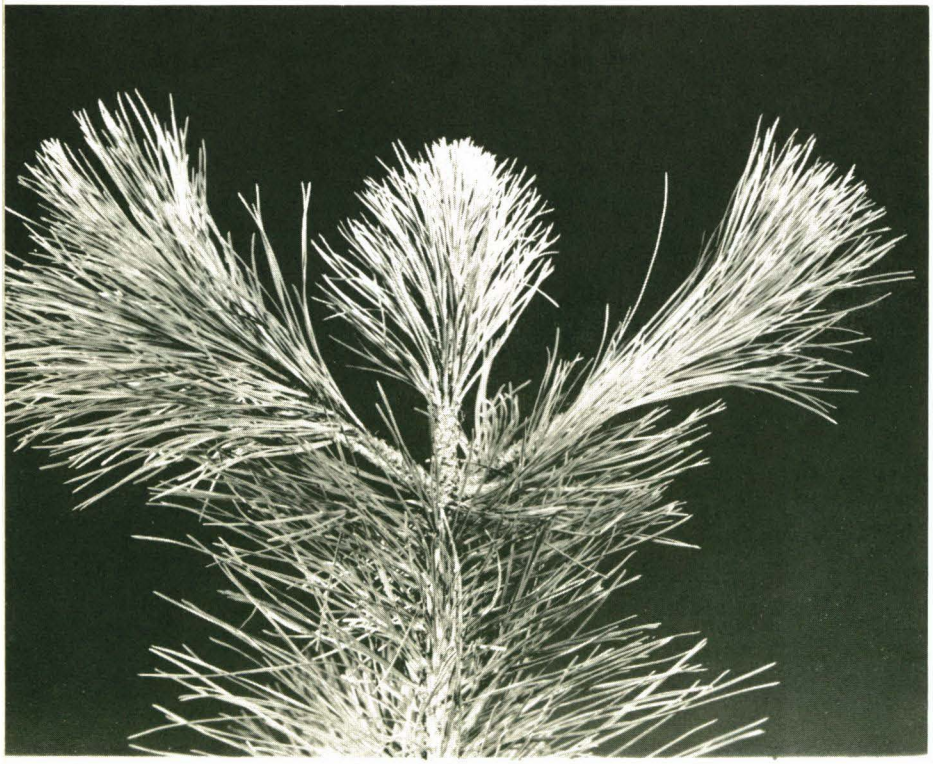

Figure 9.—Western pine shoot borer damage in ponderosa pine is indicated by the short leader and needle growth.

THE ELM LEAF BEETLE, *Pyrrhalta luteola* (Müller)

This beetle severely skeletonized the leaves of elm trees in Portland and several communities in Oregon causing premature leaf drop.

FALL WEBWORM, *Hyphantria cunea* (Drury)

A decrease in the number of tents was observed this year in the Columbia River Gorge between Portland and Hood River, Oregon. This pest caused light to moderate defoliation along Hood Canal to Sequim, Washington. A variety of broadleaves were infested, predominantly alder, cherry, willow, and cottonwood.

ALDER FLEA BEETLE, *Altica ambiens* LeC.

Above normal populations of this beetle defoliated alder on the north side of the Olympic Peninsula, in and adjacent to the Olympic National Park. Outbreaks generally subside in a season or two.

CALIFORNIA TORTOISE SHELL BUTTERFLY, *Nymphalis californica* (BDV.)

Larvae of this butterfly caused light to moderate defoliation of *Ceanothus velutinus,* snowbrush, on the Winema and Rogue River National Forests.

A PINE BUD MITE, *Triseticus* sp.

This small pest was detected in pine plantations on the Umpqua National Forest. It causes twig deformation and premature needle fall (Figure 7).

A WOOLLY PINE APHID, *Pineus coloradensis* Gill.

A high population of this pest was observed throughout the range of lodgepole and ponderosa pines, causing some trees to lose their needles prematurely.

TWO-LINED LARCH SAWFLY, *Anoplonyx occidens* Ross.

A small infestation of this insect was detected on the Wallowa-Whitman National Forest. These outbreaks usually subside within a year or two without causing any mortality.

SMALLER EUROPEAN ELM BARK BEETLE,

Adults and larvae were collected from trap elm logs placed at Hood River, Hood River County; Medford, Jackson County; and Grants Pass, Josephine County, Oregon. These are new county records. The Medford and Grants Pass collections are particularly important as they represent the first records documenting the occurrence of this scolytid west of the Cascades. Eastern counties from which collections have been made include Wasco, Umatilla, Malheur, Klamath and Lake.

WESTERN PINE SHOOT BORER, *Eucosma sonomana* Kearf.

Infestations of this insect are common throughout the range of ponderosa pine and lodgepole pine in eastern Oregon and Washington. Both natural stands and plantations are affected. A condition of "hollow pith" or "ruptured pith" is often associated with western pine shoot borer attacks. The cause of this condition is unknown (Figures 8 and 9).

Ground detection surveys made in Oregon and Washington ponderosa pine plantations revealed that infestation centers within individual plantations were scattered. Terminal and lateral shoot mining intensities were lower in Washington, but higher in central and southern Oregon.

CONE AND SEED INSECTS

The 1971 Douglas-fir cone crops west of the Oregon and Washington Cascades were medium to heavy. Douglas-fir scale midge, *Contarinia oregonensis* Foote, infestations were light. Seed damaged by the Douglas-fir cone moth, *Barbara colfaxiana* (Kft.), ranged from 1 to 18 percent. The Douglas-fir seed chalcid, *Megastigmas spermotrophus* Wachtl, destroyed less than 3 percent of the seed in the cones sampled.

LEAFHOPPERS

A large population of a leafhopper, *Dikraneura carneola* Stal., caused severe damage to the range grasses on a revegetation project on the Malheur National Forest. This leafhopper was abundant in many eastern Oregon range areas this year.

CALIFORNIA OAKWORM, *Phryganidia californica* Packard

This pest caused moderate to heavy defoliation of golden chinkapin in several areas of Douglas and Lane Counties, Oregon. No control was attempted.

SATIN MOTH, *Stilpnotia salicis* (Linn.)

Large numbers of adults were seen this year in central Oregon. Many trees and shrubs, especially willows, were completely defoliated by the larvae this spring.

GRASSHOPPERS

A severe outbreak of grasshoppers occurred in eastern and central Oregon, primarily on range lands. However, a few young pine trees within these infestation centers were defoliated. The principal species involved were the migratory grasshopper, *Melanoplus sanguinipes* Scudder, the Packard grasshopper, *Melanoplus packardi* Scudder, and an Enigma, *Oedaleonotus enigma* Scudder. Control may be undertaken in some areas in 1972.

MAJOR DISEASES

The impact of diseases is receiving interest as more forest lands come under intensive management. Emphasis is shifting from decays in old growth to diseases associated with young trees and plantations.

It is estimated that diseases reduce forest productivity in Oregon and Washington by over 400 million cubic feet each year. This impact equals almost 13 percent of the annual growth. Prospects for reducing this huge drain, mostly through the use of proper management practices, are excellent.

BLACK STAIN ROOT DISEASE, *Verticicladiella wagenerii* Kendrick

This disease which causes staining, resinosis and death of Douglas-fir roots was found in plantations on the Olympic, Gifford Pinchot, Snoqualmie, Mt. Hood, Willamette, Wallowa-Whitman, Siuslaw, Siskiyou, and Umpqua National Forests this past summer. Although very few trees per acre appear to be affected at this time, it is anticipated that this disease will become increasingly important. It has been recently reported in several western Regions.

ANNOSUS ROOT ROT, *Fomes annosus* (Fr.) Cooke

Thinning in western hemlock in Oregon and Washington is resulting in considerable root and butt rot caused by *F. annosus*. Studies conducted by the Washington Department of Natural Resources demonstrated the effectiveness of borax in preventing stump colonization. Infection centers have been reported in precommercially thinned ponderosa and lodgepole pine. Annosus root rot could become one of the major diseases of the Pacific Northwest.

SHOESTRING ROOT ROT, *Armillaria mellea* (Vahl) Quel.

This root rot was reported more frequently than any other disease in a recently completed Plantation Disease Survey. Severe mortality has occurred on some St. Regis lands in south-central Washington. The impact from this disease is expected to increase in areas of poor site and where non-native trees have been planted.

RHIZINA ROOT ROT, *Rhizina undulata* Fr.

A survey presently being conducted by the University of Washington, and the Washington Department of Natural Resources has indicated this root disease of seedling Douglas-fir can cause serious local mortality. Tree killing occurs only on burned areas planted within one to two years after burning.

LAMINATED ROOT ROT, *Poria weirii* Murr.

This root disease has been estimated to cause an annual loss of 32 million cubic feet in Oregon and Washington Douglas-fir. Originally thought to be most damaging in stands over 40 years old, it is now recognized as the most serious disease of Douglas-fir plantations. An aerial detection method developed this past year will permit measurement of impact in the Cascade Range next year.

DWARF MISTLETOES, *Arceuthobium* spp.

Dwarf mistletoes cause an annual growth loss of 147 million cubic feet per year in Region 6. Most of the major conifer species are affected. The opportunity for reducing this loss through silvicultural treatment is excellent. Control and prevention efforts are expanding.

Figure 10.—Female dwarf mistletoe plants on lodgepole pine bole.

The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.